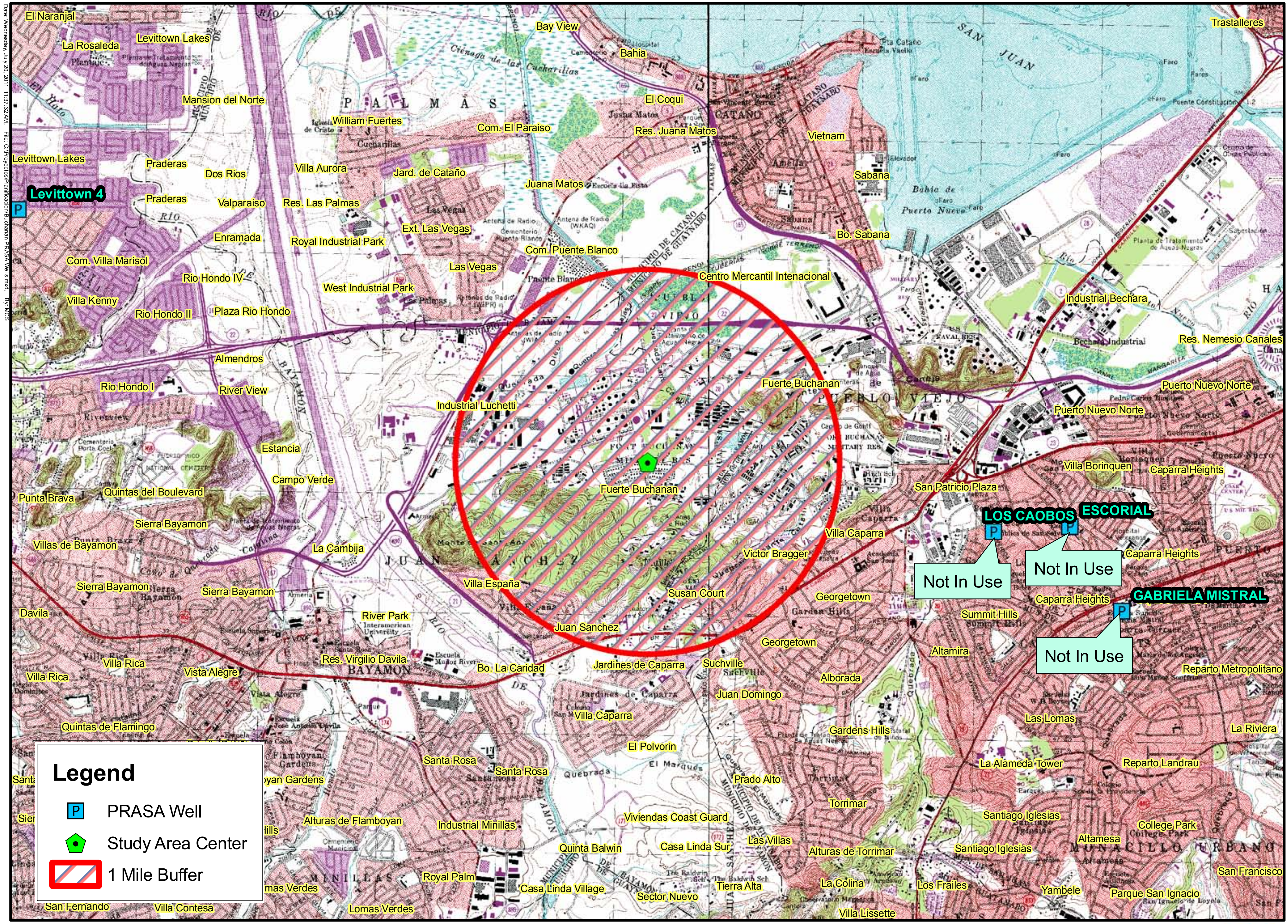
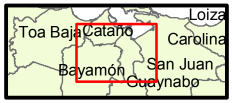
Appendix F

Well Inventories

Northwest Boundary Area RCRA Facility Investigation
Fort Buchanan, Puerto Rico





PRASA Wells

GIS AAA

1:40,000

NAD 83 Coordinate System

0 160 320 640 960 1,280 Meters

Autoridad de Acueductos y Alcantarillados

FRANQUICIAS

NOMBRE	NUMRAD	NUMASIG	SITE1	SITE2	SITE3	MUNICIPIO	MGA	TIPO-USO	FUENTE
LINDE GAS PUERTO RICO INC.	RO-12-08-04-FI-70118	FI	BO. PALMAS	PARQUE INDUSTRIAL PALMAS	CARR#869 KM. 1.8	CATANO	96000	INDUSTRIAL	QUEBRADA CANO AGUAS
BACARDI CORP.	RR-14-07-03-FI-70162	FI	BO. PALMAS	CARR#165 KM. 2.6		CATANO	1825000	INDUSTRIAL	POZO
LIQUID AIR P.R. CORP.		RF-415-94	CARR. 169 KM.1.8	SEC. PARQUE INDUSTRIAL	PALMAS BO. PALMAS	CATANO	96000	INDUSTRIAL	CAÑO
ATLANTIC PIPE	RR-12-2-97RA31	RFI-2-47-97				CATANO		INDUSTRIAL	POZO
CARIBBEAN ELECTROPLATING INC.	RR-24-01-01-FI-70012	FI	BO. PALMAS	CARR#869 KM. 0.5		CATANO	1642500	INDUSTRIAL	POZO

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
GSA Center, Suite 400-15
651 Federal Drive
Guaynabo, Puerto Rico 00965-5703

April 7, 2009

Mr. Aníbal Negrón, Environmental Coordinator
Environmental Engineering Division
Department of the Army
65th U.S. Army Regional Support Command
Fort Buchanan, Puerto Rico

Re: ***Groundwater site inventory for wells located in Fort Buchanan area, Puerto Rico***

According to the U.S. Geological Survey (USGS) Ground Water Site Inventory (GWSI), there are seventy nine (79) groundwater wells within a radius of 2.0 mile of the study site, located in Bayamón and San Juan USGS quadrangles. The latitude and longitude of the center of the study area is 18° 24' 44" 66° 07' 46".

The GWSI is updated on an irregular basis by geographic areas. Therefore, it is recommended that you contact the Puerto Rico Department of Natural and Environmental Resources, Franchise Division, to verify which wells may exist but are not listed in our files. Attached is a table containing the information of groundwater wells.

If you need any further information, please contact Wanda L. Molina at (787) 749-4346, ext. 259.

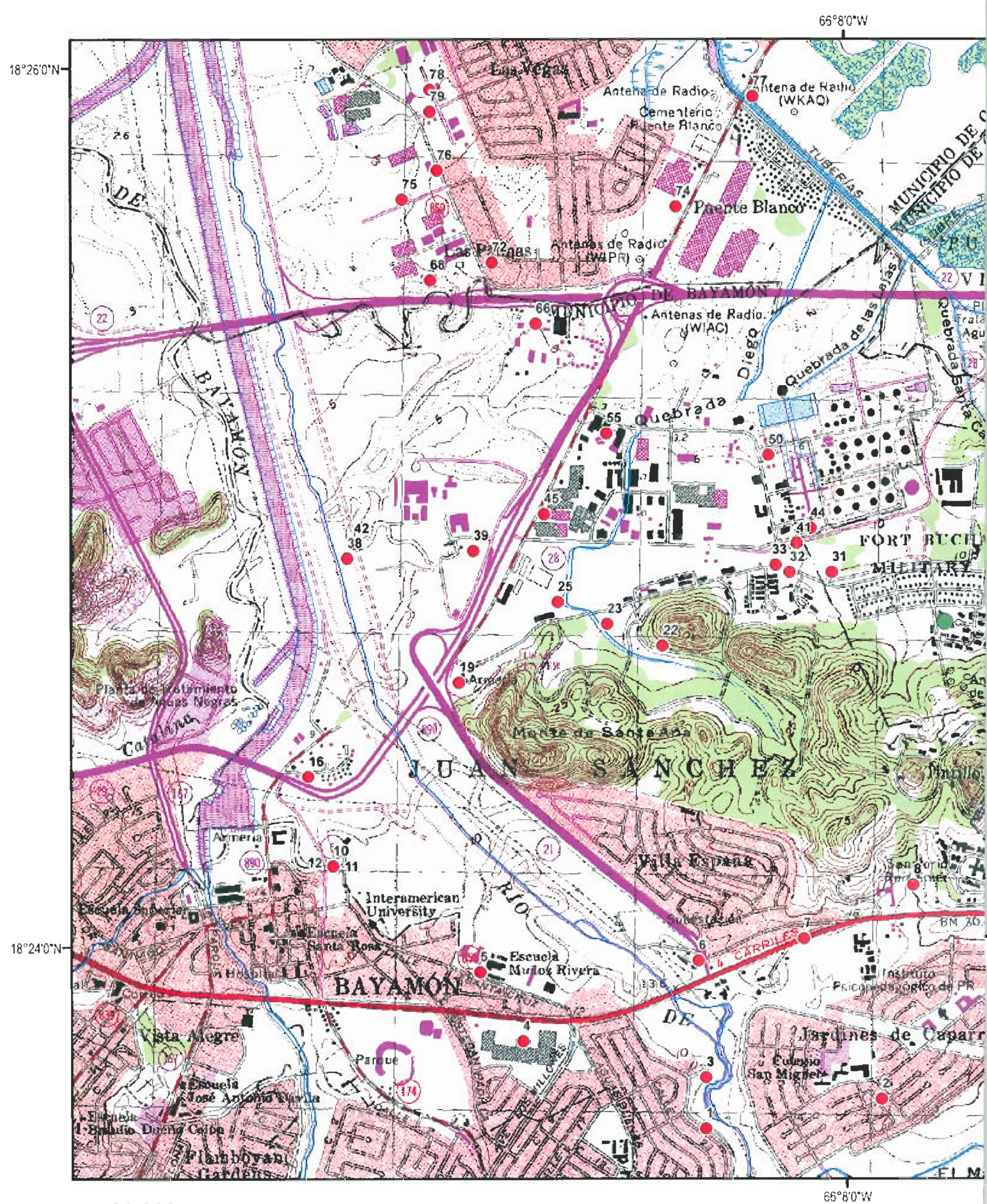
Cordially,

Pedro L. Díaz, Director
USGS Caribbean Water Science Center
Telephones: (787) 749-4346 ext. **222**
E-mail: pldiaz@usgs.gov
Fax: (787) 749-4301

Groundwater Site Inventory in Fort Buchanan Area								
Well ID	Well Name	Latitude	Longitude	Primary Use of Site	Primary Use of Water	Well Depth in feet	Local Other ID	Map Number
182335066082000	BAYAMON 6 WELL, BAYAMON, PR	182335	0660820	U	U	118.00	23-66.08-03-47	1
182339066075500	QUINONES WELL, BAYAMON, PR	182339	0660755	W	S		23-66.07-01-31	2
182342066082000	PRASA SANTA ROSA 1 WELL, BAYAMON, PR	182342	0660820	U	U	118.0	23-66.08-04-27	3
182347066084600	LOS MILLONES WELL, BAYAMON, PR	182347	0660846	Z	U		23-66.08-02-23	4
182356066085200	HOSPITAL SAN PABLO WELL BAYAMON, PR	182356.5	0660852.1	W	C		23-66.08-07-02	5
182358066082100	VAQUERIA LA CARIDAD WELL, BAYAMON, PR	182358	0660821	Z	U	300.0	23-66.08-01-07	6
182401066080600	SHELL OIL WELL, BAYAMON, PR	182401	0660806	Z	U	270.0	24-66.08-06-100	7
182408066075000	PSICHIATRIC HOSPITAL WELL BAYAMON, PR	182408.3	0660750.4	U	U		24-66.07-01-82	8
182410066072500	ESPINOSA WELL, GUAYNABO, PR	182410	0660725	Z	U	262.0	24-66.07-06-86	9
182411066091300	GENERAL GASES 1 WELL, BAYAMON, PR	182411	0660913	U	U	150.0	24-66.09-01-88	10
182411066091301	GENERAL GASES 2 WELL, BAYAMON, PR	182411	0660913	U	U	150.0	24-66.09-02-88	11
182411066091302	GENERAL GASES 3 WELL, BAYAMON, PR	182411	0660913	U	U		24-66.09-03-88	12
182420066070200	SAN MIGUEL WELL, GUAYNABO, PR	182420	0660702	U	U		24-66.07-04-70	13
182420066073100	WOLF WELL, GUAYNABO, PR	182420	0660725	U	U	73.66	24-66.07-05-66	14
182421066063300	ANTONGIORGI WELL, GUAYNABO, PR	182421	0660633	Z	U		24-66.06-11-65	15
182423066091600	PR CAR CARE WELL BAYAMON, PR	182423.2	0660916.5	W	C		24-66.09-06-68	16
182426066063400	OJEDA WELL, GUAYNABO, PR	182426	0660634	Z	U		24-66.06-10-55	17
182433066061000	LOS CAOBOS WELL, GUAYNABO, PR	182433	0660610	W	P	120.0	24-66.06-12-44	18
182436066085500	FORT BUCHANAN 2 WELL, BAYAMON, PR	182436	0660855	Z	U	340.0	24-66.08-02-31	19
182438066062800	CAPARRA DAIRY 1 WELL, GUAYNABO, PR	182438	0660628	Z	U	237.0	24-66.06-08-36	20
182440066072300	FT. BUCHANAN 10 WELL, GUAYNABO, PR	182440	0660723	W	P	137.0	24-66.07-03-37	21
182441066082600	BUCHANAN PARK WELL, BAYAMON, PR	182441	0660826	O	U		24-66.08-04-26	22
182444066083400	FORT BUCHANAN 3 WELL, BAYAMON, PR	182444	0660834	U	U	171.0	24-66.08-05-25	23
182447066072400	FORT BUCHANAN 6 WELL, GUAYNABO, PR	182447	0660724	U	U	125.0	24-66.07-02-27	24
182447066084100	FORT BUCHANAN 4 WELL, BAYAMON, PR	182447	0660841	U	U	175.0	24-66.08-03-24	25
182448066060800	U.S. NAVY 2 WELL, GUAYNABO, PR	182448	0660608	Z	U	234.0	24-66.06-01-18	26
182448066061100	CAPARRA MOTORS WELL, GUAYNABO, PR	182448	0660611	Z	U	148.0	24-66.06-06-19	27
182450066072000	FORT BUCHANAN 5 WELL, GUAYNABO, PR	182450	0660720	Z	U	120.0	24-66.07-01-17	28
182451066062800	FORT BUCHANAN 1 WELL, GUAYNABO, PR	182451	0660628	Z	U	202.0	24-66.06-04-16	29
182451066063500	FORT BUCHANAN 2 WELL, GUAYNABO, PR	182451	0660635	Z	U	50.0	24-66.06-03-15	30

Groundwater Site Inventory in Fort Buchanan Area								
Well ID	Well Name	Latitude	Longitude	Primary Use of Site	Primary Use of Water	Well Depth in feet	Local Other ID	Map Number
182451066080200	PIEZOMETER FORT BUCHANAN 1, BAYAMON, PR	182451	0660802	O	U	249.4	24-66.08-12-17	31
182451066080800	ESCUELA FORT BUCHANAN 2 WELL, BAYAMON, PR	182451	0660808	U	U		24-66.08-10-19	32
182452066081000	ESCUELA FORT BUCHANAN 1 WELL, BAYAMON, PR	182452	0660810	U	U		24-66.08-09-19	33
182453066064100	PIEZOMETER U.S. NAVY 4, GUAYNABO, PR	182453	0660641	Z	U	102.0	24-66.06-02-14	34
182453066064101	PIEZOMETER U.S. NAVY 1, GUAYNABO, PR	182453	0660641	T	U		24-66.06-13-14	35
182453066064102	PIEZOMETER U.S. NAVY 2, GUAYNABO, PR	182453	0660641	T	U		24-66.06-14-14	36
182453066064103	PIEZOMETER U.S. NAVY 3, GUAYNABO, PR	182453	0660641	T	U	18.0	24-66.06-15-14	37
182453066091100	CENTRAL JUANITA 2 WELL, BAYAMON, PR	182453	0660911	C	U		24-66.09-06-19	38
182454066085300	EDMUNDO WELL, BAYAMON, PR	182454	0660853	W	H	90.0	24-66.08-07-02	39
182455066061800	CAFE RICO WELL, GUAYNABO, PR	182455	0660618	U	U		24-66.06-05-07	40
182455066080700	FORT BUCHANAN 7 WELL, BAYAMON, PR	182455	0660807	Z	U	200.0	24-66.08-01-19	41
182455066091000	CENTRAL JUANITA 1 WELL, BAYAMON, PR	182455	0660910	Z	U		24-66.09-05-09	42
182456066060800	PRIDCO WELL, GUAYNABO, PR	182456	0660608	Z	U	52.5	24-66.06-07-08	43
182457066080500	GULF 1 WELL, BAYAMON, PR	182457	0660805	W	N		24-66.08-11-09	44
182458066084200	LA GOYA WELL, BAYAMON, PR	182459.0	0660842.9	W	N		24-66.08-08-03	45
182502066065700	FORT BUCHANAN 3 WELL, GUAYNABO, PR	182502	0660657	Z	U	141.0	25-66.06-01-91	46
182503066063400	CONCRETO MIXTO WELL, GUAYNABO, PR	182503	0660634	U	U		25-66.06-10-95	47
182507066063600	PAPER MILL 6 WELL, GUAYNABO, PR	182507	0660636	Z	U		25-66.06-06-84	48
182507066063900	EL NUEVO DIA WELL GUAYNABO, PR	182507.4	0660639.4	W	N	250	25-66.06-14-84	49
182507066081100	CARIBBEAN REFINERY WELL, BAYAMON, PR	182507	0660811	W	N	110.0	25-66.08-04-89	50
182509066073400	FORT BUCHANAN 8 WELL, GUAYNABO, PR	182509	0660729	Z	U	150.0	25-66.07-01-85	51
182510066070800	PUERTO RICO CEMENT 2 WELL, GUAYNABO, PR	182510	0660708	W	N	60.0	25-66.07-02-89	52
182510066070801	PUERTO RICO CEMENT 3 WELL, GUAYNABO, PR	182510	0660708	W	N	100.0	25-66.07-03-89	53
182510066071300	PUERTO RICO CEMENT 4 WELL, GUAYNABO, PR	182510	0660713	U	U		25-66.07-04-88	54
182510066083400	INTERSTATE ENGINEERING CORP. WELL, BAYAMON,	182510	0660834	U	U	150.0	25-66.08-06-85	55
182511066070700	PUERTO RICO CEMENT 6 WELL, GUAYNABO, PR	182511	0660707	Z	U	90.17	25-66.07-06-89	56
182511066071100	PUERTO RICO CEMENT 5 WELL, GUAYNABO, PR	182511	0660711	U	U		25-66.07-05-87	57
182512066070700	PUERTO RICO CEMENT 7 WELL, GUAYNABO, PR	182512	0660707	Z	U	90.0	25-66.07-07-89	58
182515066063900	PAPER MILL 3 WELL, GUAYNABO, PR	182515	0660639	Z	U	155.0	25-66.06-04-74	59
182516066060200	PRIDCO 2 WELL, GUAYNABO, PR	182516	0660602	Z	U		25-66.06-08-80	60

Groundwater Site Inventory in Fort Buchanan Area								
Well ID	Well Name	Latitude	Longitude	Primary Use of Site	Primary Use of Water	Well Depth in feet	Local Other ID	Map Number
182517066064200	PRIDCO 4 WELL, GUAYNABO, PR	182517	0660642	Z	U	164.0	25-66.06-03-74	61
182520066064600	PAPER MILL 2 WELL, GUAYNABO, PR	182520	0660646	Z	U		25-66.06-07-63	62
182520066064900	MONTALVO 2 WELL, GUAYNABO, PR	182520	0660649	W	N	82.0	25-66.06-09-62	63
182521066064800	MONTALVO 1 WELL, GUAYNABO, PR	182521	0660648	W	N		25-66.06-02-63	64
182521066074300	PACKING WELL, GUAYNABO, PR	182521	0660643	W	N		25-66.06-12-63	65
182525066084400	ATLANTIC CONCRETE WELL, BAYAMON, PR	182525	0660844	W	J	125.0	25-66.08-07-53	66
182531066075900	PIEZOMETER BLDG 652 GUAYNABO, PR	182531.00	0660659.72	T	U	192.5	25-66.06-11-41	67
182531066085900	BACARDI CORP. 1 WELL, CATANO, PR	182531	0660859	Z	U	156.0	25-66.08-02-11	68
182532066065801	USGS BLDG 652 WELL, GUAYNABO, PR	182531.87	0660700.52	O			25-66.07-009-50	69
182532066070200	PRIDCO 8 WELL, GUAYNABO, PR	182532	0660702	Z	U		25-66.07-08-50	70
182533066064500	FORT BUCHANAN NC-1 WELL, GUAYNABO, PR	182533	0660645	Z	U		25-66.06-13-43	71
182533066085000	CARIBBEAN ELECTROPLATING WELL CATANO, PR	182533.4	0660850.2	W	N		25-66.08-10-42	72
182539066063900	PAPER MILL 1 WELL, GUAYNABO, PR	182539	0660639	Z	U		25-66.06-05-84	73
182541066082400	WIPR WELL, CATANO, PR	182541	0660824	U	U		25-66.08-05-37	74
182542066090300	VAQUERIA RAMOS WELL, CATANO, PR	182542	0660903	U	U	175.0	25-66.09-03-40	75
182546066085800	DEFENSE DEPARTMENT WELL, CATANO, PR	182546	0660858	U	U	163.60	25-66.08-01-21	76
182556066081300	SIDERURGICA WELL, CATANO, PR	182556	0660813	U	U		25-66.09-01-08	77
182557066085900	BACARDI CORP. 2 WELL, CATANO, PR	182557	0660859	Z	U	144.0	25-66.08-03-01	78
182554066085900	BACARDI 2 WELL, CATANO, PR	182554	0660859	U	U	148.0		79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Puente Blanco
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MUNICIPIO DE BAYAMÓN
Antenas de Radio (WIAC)
TUBERÍAS
Quebrada de las Lajas
Quebrada Santa Catalina
Quebrada
Diego
BAYAMÓN
FORT BUCHANAN
MILITARY
Armería
Monte de Santa Ana
Planta de Tratamiento de Aguas Negras
JUAN SÁNCHEZ
Villa España
Armería
Interamerican University
Escuela Superior
Escuela Santa Rosa
Escuela Muñoz Rivera
Subestación
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Instituto Psicopedagógico de PR
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MILITARY RES.
Campo de Golf
FORT BUCHANAN
MILITARY RES.
PUEBLO VIEJO
Canteras
High Sch
Villa Caparra
INTERSECCION CAPARRA
Parkside
Los Rumbos de Caparra
Academia San José
Caparra Hills
Los Cantos
Garden Hills
Summit Hills
CAPARRA HEIGH
Altamira
Suchville
Hogar Estatal de Niños
Planta de Tratamiento de Aguas Neg
Montes de San Patricio
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Table 12. Primary Use of Site Codes

Code	Description	Definition
A	Anode	Anode is a hole used as an electrical anode. Include in this category wells used solely to ground pipelines or electronic relays and other installations.
C	Standby	Standby emergency supply refers to a water-supply emergency source that is used only when the principal supplier supply of water is unavailable.
D	Drain	Drainage refers to the drainage of surface water underground.
E	Geothermal	Geothermal well is a hole drilled for geothermal energy development.
G	Seismic	Seismic hole is one drilled for seismic exploration. If it has been converted to water supply, it is used to withdraw water. A seismic hole used as an observation well should be in the observation-well category.
H	Heat reservoir	Heat reservoir refers to a well in which a fluid is circulated in a closed system. Water is neither added to, nor removed from, the aquifer.
M	Mine	Mine includes any tunnel, shaft, or other excavation constructed for the extraction of minerals.
O	Observation	Observation well is a cased test-hole or well, drilled for either water-level or water-quality observations. Do not use this category for an oil-test hole, or water-supply well used only incidentally as an observation well.
P	Oil or gas well	Oil or gas well is any well or hole drilled in search of, or for production of, petroleum

		or gas. It includes any oil or gas production well, dry hole, core hole, injection well
		drilled for secondary recovery of oil, etc. An oil-test hole converted to a water-supply well should be classified as withdrawal (W).
R	Recharge	Recharge site is a site constructed or converted for use in replenishing the aquifer.
		An irrigation well used to return water to the aquifer during nonpumping periods is a
		well for withdrawing water, not a drainage or recharge well. Use this category for wells that are used to return water to the aquifer after use, such as those for returning air-conditioning water.
S	Repressurize	Repressurize refers to pumping water into an aquifer in order to increase the pressure
		in the aquifer for a specific purpose; for example, water flood purposes in oil fields.
T	Test	Test hole is an uncased hole (or one cased only temporarily) that was drilled for water, or for geologic or hydrogeologic testing. It may be equipped temporarily with a pump in order to make a pumping test, but if the well is destroyed after testing is completed, it is still a test hole. A core hole drilled as a part of mining or quarrying exploration work should be in this class.
U	Unused	An unused site is an abandoned water-supply site or one for which no use is contemplated.
		At an abandoned farmstead, a well originally used for domestic purposes may be classed
		as unused, even though it is equipped with a pump. Similarly, a stock well with a pump
		may become unused when a pasture or corral is put into cultivation. An irrigation well
		that is not equipped with a pump, nor used because the yield is too low or the water is too mineralized, belongs in this class.
W	Withdrawal of	Withdrawal of water refers to a site where water is extracted. It includes a dewatering
		well, if the dewatering is accomplished by pumping ground water.

X	Waste disposal	A waste-disposal site is one used to convey industrial waste, domestic sewage, oil-field brine, mine drainage, radioactive waste, or other waste fluid into an under ground zone. An oil-test or deep-water well converted to waste disposal should be in this category.
Z	Destroyed	A destroyed site is one that is no longer in existence. The casing of most destroyed wells will be pulled, but some may be plugged or filled. Do not use this category for an abandoned site that merely is not in use.

Table 13. Primary Use of Water Codes

Code	Description	Definition
A	Air condition	Air conditioning refers to water supply used solely or principally for heating or cooling a building. Water used to cool industrial machinery belongs in the industrial category, not in the air-conditioning category.
B	Bottling	Bottling refers to the storage of water in bottles and use of the water for potable purposes (see Medicinal).
C	Commercial	Commercial use refers to use by a business establishment that does not fabricate or produce a product. Filling stations and motels are examples of commercial establishments. If some product is manufactured, assembled, remodeled, or otherwise fabricated, use of water for that plant should be considered industrial, even though the water is not used directly in the product or in the manufacturing of the product.
D	Dewater	Dewatering means the water is pumped for dewatering a construction or mining site,

		or to lower the water table for agricultural purposes. In this respect, it differs from a drainage well that is used to drain surface water underground. If the main purpose for which the water is withdrawn is to provide drainage, dewatering should be indicated even though the water may be discharged into an irrigation ditch and subsequently used to irrigate land.
E	Power	Power generation refers to use of water for generation of any type of power.
F	Fire	Fire protection refers to the principal use of the water and should be indicated if the site was constructed principally for this purpose, even though the water may be used at times to supplement an industrial or defense supply, to irrigate a golf course, fill a swimming pool, or for other use.
H	Domestic	Domestic use is water used to supply household needs, principally for drinking, cooking, washing, and sanitary purposes, but including watering a lawn and caring for a few pets. Most domestic wells will be at suburban or farm homes, but wells supplying small quantities of water for domestic purposes for one-classroom schools, turnpike gates, and similar installations, should be in the domestic category.
I	Irrigation	Irrigation refers to the use of water to irrigate cultivated plants. Most irrigation sites will supply water for farm crops, but the category should include wells used to water the grounds of schools, industrial plants, or cemeteries, if more than a small amount of water is pumped and that is the sole use of the water.
J	Industrial	Industrial cooling refers to a water supply used solely for industrial cooling.
K	Mining	Mining refers to a water supply used solely for mining purposes.
M	Medicinal	Medicinal refers to water purported to have therapeutic value. Water may be used for

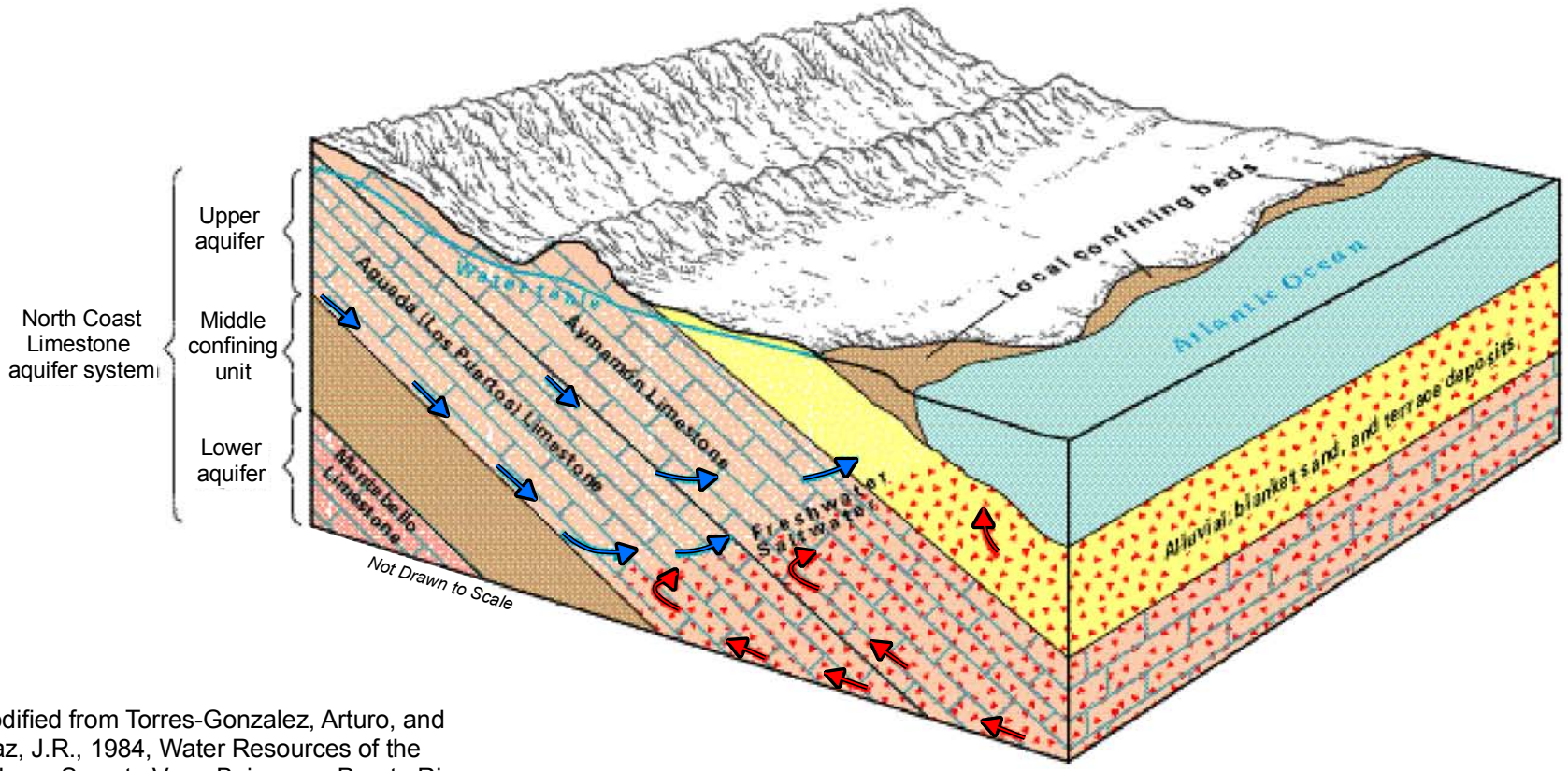
		bathing and/or drinking. If use of water is mainly because of its claimed therapeutic value, use this category even though the water is bottled.
N	Industrial	Industrial use is within a plant that manufactures or fabricates a product. The water may or may not be incorporated into the product being manufactured. Industrial water may be used to cool machinery, to provide sanitary facilities for employees, to air-condition the plant, and to irrigate the ground at the plant.
P	Public supply	Public Supply use is water that is pumped and distributed to several homes. Such supplies may be owned by a municipality or community, a water district, or a private concern. In most States, public supplies are regulated by departments of health which enforce minimum safety and sanitary requirements. If the system supplies five or more homes, it should be considered a public supply, as four or less classify use as domestic. Water supplies for trailer or summer camps with five or more living units should be in this category, but motels and hotels are classified as commercial. Most public supply systems also furnish water for a variety of other uses, such as industrial, institutional, and commercial.
Q	Aquaculture	Aquaculture refers to a water supply used solely for aquaculture, such as fish farms.
R	Recreation	Recreation refers to water discharged into pools (or channels which are dammed downstream to form pools), for swimming, boating, fishing, ice rinks, and other recreational uses.
S	Stock	Stock Supply refers to the watering of livestock.
T	Institutional	Institutional refers to water used in the maintenance and operation of institutions such as large schools, universities, hospitals, rest homes, or similar installations.

		Owners of institutions may be individuals, corporations, churches, or governmental units.
U	Unused	Unused means water is not being removed from the site for one of the purposes described above. A test hole, oil or gas well, recharge, drainage, observation, or waste-disposal well will be in this category. Do not use this classification for an irrigation, domestic, stock, or other well during "off season" or temporary periods of nonuse. The use of water from a newly constructed site should be considered as the use for which it is intended even though it may not yet be in use when inventoried.
Y	Desalination	Desalination refers to water used in a desalting process whereby dissolved solids are removed to make water potable or suitable for other uses. Enter the type of use of the desalinated water in the next column, "Secondary Water Use".
Z	Other	Other refers to miscellaneous uses not included in the listed categories.

Direction of Groundwater Movement

Freshwater

Saltwater



Modified from Torres-Gonzalez, Arturo, and Diaz, J.R., 1984, Water Resources of the Sabana Seca to Vega Baja area, Puerto Rico: U.S. Geological Survey Water-Resources Investigations Report 82-4115, 53p.

Saltwater - Freshwater Interface

Figure F-1

Fort Buchanan, Puerto Rico

EA Engineering, Science, and Technology

\\Edgewoodfp\Projects\Universal GIS\Buchanan\Figure 6-3 Saltwater Freshwater Interface.mxd